

Open Source Satellite Work is Free of ITAR

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The United States Department of State has ruled favorably on Open Research Institute's commodity jurisdiction request, finding that specified "Information and Software for a Digital Microwave Broadband Communications System for Space and Terrestrial Amateur Radio Use" is definitely not subject to State Department jurisdiction under ITAR, the International Traffic in Arms Regulations. This is an important step toward reducing the burden of regulations restricting international cooperation on amateur satellite projects, which have impeded engineering work by amateurs in the United States for decades.

Export regulations divide both technical information and actual hardware into three categories. The most heavily restricted technologies fall under ITAR, which is administered by the State Department. Technologies subject to more routine restrictions fall under EAR, the Export Administration Regulations, administered by the Department of Commerce. Technologies that are not subject to either set of regulations are not restricted for export.

On 20 February 2020, Open Research Institute filed a Commodity Jurisdiction Request with the US State Department, seeking to establish that key technologies for amateur radio are not subject to State Department jurisdiction. "Information and Software for a Digital Microwave Broadband Communications System for Space and Terrestrial Amateur Radio Use" was assigned the case number CJ0003120. On 11 August 2020, the case received a successful final determination: the technology is not subject to State Department jurisdiction. This is the best possible outcome of a CJ request.

The Final Determination letter, Commodity Jurisdiction cover letter, and the application itself can be found at:

<https://github.com/phase4ground/documents/tree/master/Regulatory>

The summary of the Commodity Jurisdiction request will eventually be published by the State Department at:

https://www.pmdtc.state.gov/?id=ddtc_kb_article_page&sys_id=6ea6afdcdcb36300529d368d7c96194b

Under this determination, the technologies are subject to the EAR. The next step is to submit a classification request to the Commerce Department. ORI anticipates that the Commerce Department will find that these technologies are unrestricted under the carve-out for open source in the EAR. This step is underway. The step after that is an Advisory Opinion request. This request will ask that openly published work ceases to be subject to the EAR. This establishes a full chain of documentation for open source amateur radio satellite service work.

Open Research Institute (ORI) is a non-profit research and development organization which provides all of its work to the general public under the principles of Open Source and Open Access to Research. ORI is an AMSAT Member Society and is an Open Source Initiative Affiliate Member. ORI does not sell memberships. It is registered and operates as a research institute, and not a member society. The purpose of this filing is to reduce risk to technical volunteers in the amateur radio satellite service by enabling free and open international collaboration.

This regulatory work was accomplished by a team of dedicated and competent open source volunteers. The effort was initiated by Bruce Perens K6BP and lead by Michelle Thompson W5NYV.

Open Research Institute developed the ideas behind the Commodity Jurisdiction request, hired Thomsen and Burke LLP for expert legal advice, organized the revisions of the document, and invited organizations and individuals with amateur satellite service interests to join or support the request.

ORI thanks Libre Space Foundation and Dr. Daniel Estevez for providing their subject matter expertise and written testimony, and JAMSAT for helpful encouragement and support.

The legal costs were fully reimbursed with a generous grant from Amateur Radio Digital Communications (ARDC). See <https://www.ampr.org/grants/grant-open-research-institute/>.

ARDC and ORI share a vision of clearly establishing open source as the best and safest way to accomplish technical volunteer work in amateur radio. This final determination letter provides solid support for that vision. The determination enables the development of implementation guidelines that will allow free international collaboration. The path is clear for a number of interesting projects facilitating new methods for terrestrial and satellite communications, opening the door to robust global digital amateur communications.

Another part of the discussion with the law firm was how these results can be best used by others. This has significant relevance in industry and academia. Our goal is to make it as easy as possible to use the results. There were three suggestions here.

- 1) Write implementation guidelines and policies for others to adopt.
- 2) Help people that have the money for it make additional similar filings.
- 3) Write about it in popular and technical press.

The goal of additional filings is to build a body of Final Determination letters

that solidly support a wide variety of open source work. This is somewhat similar to the way patent portfolios work in commercial settings. It's the sort of thing AMSAT can definitely help with.

This effort gives direct and large benefits to a large number of organizations, but it benefits AMSAT in particular. It allows free and open international collaboration, dramatically reduces legal risks, increases the potential volunteer corps, simplifies fundraising, and reduces management burdens.

The work applies to orbits besides GEO and technology besides DVB-S2/X. Those that "insist" on extremely narrow final determinations can write their own Commodity Jurisdictions requests and expect to get the same result because they can use this one in their request as a model and reference. As said before, additional filings would be of great benefit to the community because a population of results strengthens the case for open source work. However, additional filings are not strictly necessary to completely reverse the ITAR/EAR situation at organizations like AMSAT.

The key to using this result, or any like it, is that the public domain carve outs in ITAR and EAR are solid and provides a bright path out of a bad place. In order to use them, one has to commit to documented open source policies and follow the law with regard to what constitutes publishing. The safest path is to avoid the things we specifically avoided. The most important thing on that list is synthetic aperture radar. This is not something that we currently do, and it is not an impediment to advanced digital communications work to avoid it.

Publishing work as it is created, freely available to the general public, is the way to use the public domain carve-outs in the law. Publishing designs and data that allow the recreation of a work of software or hardware means publishing schematics, Gerber files, bills of materials, source code, tools required, test data, test plans, and the license that that work uses. This last part is often overlooked but is a necessary part of a compliant open source policy. ORI recommends the

CERN open hardware license or the TAPR open hardware license for hardware. ORI recommends GPL version 3.0 for software. Any license recognized by Open Source Initiative is an excellent starting point. Providing regular copies of work to a public library, whether in print or on DVD, is a baseline approach for a publishing policy. Using GitHub or GitLab is another recommended baseline policy.

ORI recommends the CERN Open Hardware License v2 because of the way it enables a useful open source hardware definition in a world dominated by a wide variety of proprietary tools. For example, FPGA design is a large and growing part of our world in advanced open source digital communications. Since open source tools for FPGA are currently not capable of executing some of the required designs, as long as the tool or component meets the definition of “available component”, then the use of things like proprietary tools are allowed in the production of an open source design.

Following the example of FPGA work, this means that the VHDL source code is available for free to the general public. The FPGA is listed in the bill of materials and can be purchased. The version of Xilinx Vivado is listed, and can be obtained.

ORI’s developer and participant policies can be found here:

<https://openresearch.institute/developer-and-participant-policies/>

Open source tools and open source hardware should be used whenever possible. There must be a constant disciplined commitment to this as part of the practical approach to open source work. One of the most exciting areas of open source FGPA design right now is the emergence of a complete end-to-end open source toolchain for FPGA work.

See Project IceStorm here:

<https://github.com/YosysHQ/icestorm>

With software, using a completely open source toolchain is much easier to accomplish than it is with hardware. The CERN open hardware license was designed to address this exact issue, and it does so firmly and well.

Learn more about CERN open hardware license here:

<https://www.ohwr.org/cernohl>

This final determination letter doesn't relieve anyone of having to file for a license to take hardware out of the country, but that isn't impossibly hard either. The word from experienced commercial and amateur satellite builders is that the heavy lifting has been done. We are in a good place moving forward.

This Final Determination is a landmark result in the commercial and industrial world as well as in amateur and academic circles. Goals for the amateur radio satellite service are the absolute minimum regulatory fear and risk for amateur volunteers, and a maximum amount of free and open international technical cooperation.

Thank you! Contact ORI with questions about this Commodity Jurisdiction Request at ori@openresearch.institute